

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
16 December 2004 (16.12.2004)

PCT

(10) International Publication Number
WO 2004/109015 A2

(51) International Patent Classification⁷: **D21H 23/70**,
21/16

(21) International Application Number:
PCT/FI2004/000345

(22) International Filing Date: 7 June 2004 (07.06.2004)

(25) Filing Language: Finnish

(26) Publication Language: English

(30) Priority Data:
20030842 5 June 2003 (05.06.2003) FI

(71) Applicant (for all designated States except US): **METSO
PAPER, INC.** [FI/FI]; Fabianinkatu 9 A, FI-00130
Helsinki (FI).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LIPPONEN,
Juha** [FI/FI]; Sarvimäentie 8 L 158, FI-04200 Ker-
ava (FI). **PAKARINEN, Pekka** [FI/FI]; Kaakonkoipi
3 A 2, FI-40340 Jyväskylä (FI). **PAKARINEN, Juha**

[FI/FI]; Tellervonkatu 14-14 C 35, FI-40200 Jyväskylä
(FI). **HOLOPAINEN, Karl** [FI/FI]; Haapalahdentie 4,
FI-40950 Muurame (FI). **VESTOLA, Juhani** [FI/FI];
Tähtäin 25, FI-40630 Jyväskylä (FI). **TUOMI, Arto**
[FI/FI]; Humalakuja 1 as 12, FI-04400 Järvenpää (FI).

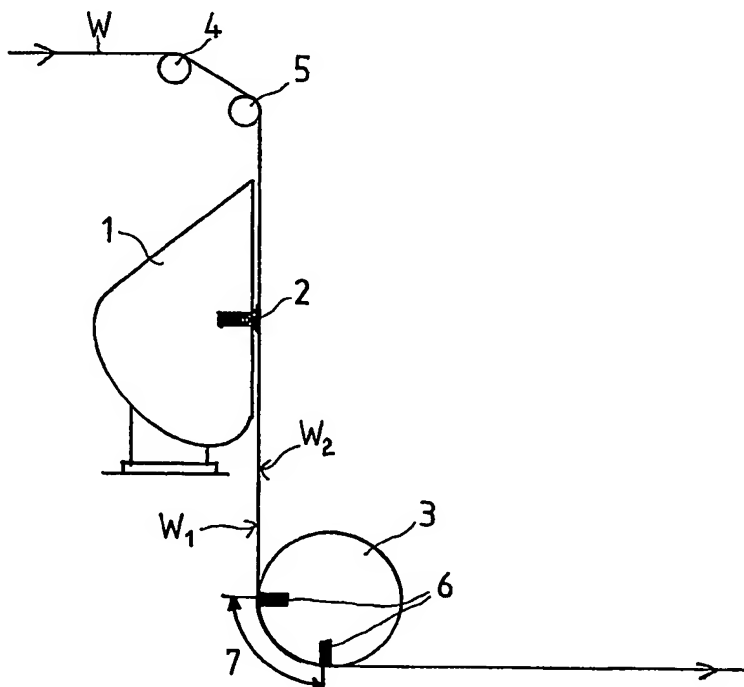
(74) Agent: **FORSSÉN & SALOMAA OY**; Eerikinkatu 2,
FI-00100 Helsinki (FI).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: METHOD AND APPARATUS IN THE SURFACE SIZING OF A PAPER OR BOARD WEB



(57) Abstract: The invention relates to a method and an apparatus in the surface sizing of a paper or board web. In the method according to the invention, surface size, such as a starch solution, is applied by means of an applicator device (1) to at least one side of the web (W) to be surface sized, and in which surface sizing is performed per one side of said web (W) in one or more stages. In connection with the application of surface size, a pressure effect is applied to the web (W) by subjecting the web (W) to an underpressure and/or to an overpressure such that, by means of said pressure effect, surface size is forced to penetrate into the web (W) into the pores of the web. Most advantageously, in the pores of the web (W) an underpressure is created that sucks surface size applied to the surface of the web from the surface of the web (W) into the pores in the inner layers. In that connection, surface size is applied to a first side (W1) of the web and a vacuum effect is applied to the opposite side, i.e. a second side (W2), of the web (W) to cause air to flow through the web (W) such that surface size moves from

the first side (W1) of the web in the direction of the second side (W2) of the web into the web (W). In a corresponding manner, both sides of the web (W) can be treated in successive stages.



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
16 December 2004 (16.12.2004)

PCT

(10) International Publication Number
WO 2004/109015 A3

(51) International Patent Classification⁷: **D21H 23/22**,
21/16, 23/70

(21) International Application Number:
PCT/FI2004/000345

(22) International Filing Date: 7 June 2004 (07.06.2004)

(25) Filing Language: Finnish

(26) Publication Language: English

(30) Priority Data:
20030842 5 June 2003 (05.06.2003) FI

(71) Applicant (for all designated States except US): **METSO
PAPER, INC.** [FI/FI]; Fabianinkatu 9 A, FI-00130
Helsinki (FI).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **LIPPONEN,
Juha** [FI/FI]; Sarvimäentie 8 L 158, FI-04200 Ker-
ava (FI). **PAKARINEN, Pekka** [FI/FI]; Kaakonkoipi

3 A 2, FI-40340 Jyväskylä (FI). **PAKARINEN, Juha**
[FI/FI]; Tellervonkatu 14-14 C 35, FI-40200 Jyväskylä
(FI). **HOLOPAINEN, Karl** [FI/FI]; Haapalahdentie 4,
FI-40950 Muurame (FI). **VESTOLA, Juhani** [FI/FI];
Tähtäin 25, FI-40630 Jyväskylä (FI). **TUOMI, Arto**
[FI/FI]; Humalakuja 1 as 12, FI-04400 Järvenpää (FI).

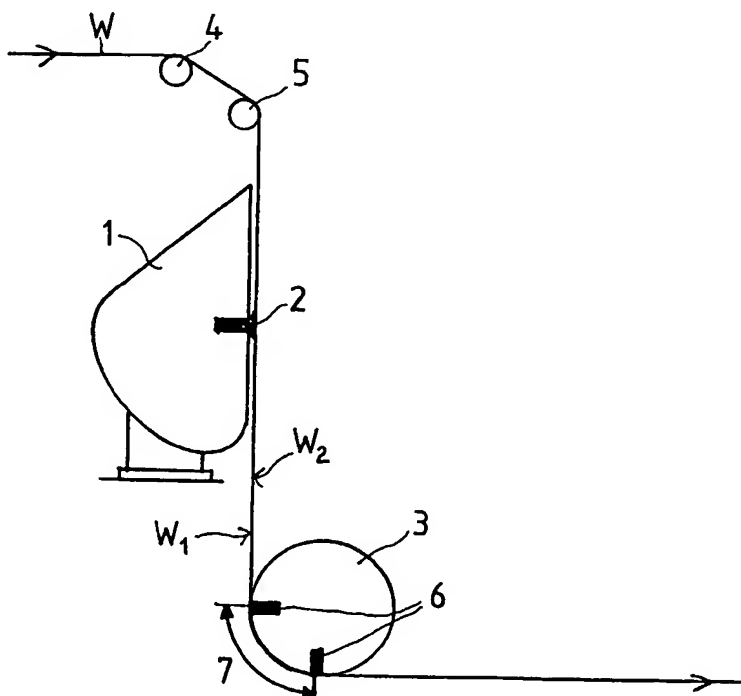
(74) Agent: **FORSSÉN & SALOMAA OY**; Eerikinkatu 2,
FI-00100 Helsinki (FI).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: METHOD AND APPARATUS IN THE SURFACE SIZING OF A PAPER OR BOARD WEB



(57) Abstract: The invention relates to a method and an apparatus in the surface sizing of a paper or board web. In the method according to the invention, surface size, such as a starch solution, is applied by means of an applicator device (1) to at least one side of the web (W) to be surface sized, and in which surface sizing is performed per one side of said web (W) in one or more stages. In connection with the application of surface size, a pressure effect is applied to the web (W) by subjecting the web (W) to an underpressure and/or to an overpressure such that, by means of said pressure effect, surface size is forced to penetrate into the web (W) into the pores of the web. Most advantageously, in the pores of the web (W) an underpressure is created that sucks surface size applied to the surface of the web from the surface of the web (W) into the pores in the inner layers. In that connection, surface size is applied to a first side (W1) of the web and a vacuum effect is applied to the opposite side, i.e. a second side (W2), of the web (W) to cause air to flow through the web (W) such that surface size moves from the first side (W1) of the web in the direction of the second side (W2) of the web into the web (W). In a corresponding manner, both sides of the web (W) can be treated in successive stages.



GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) Date of publication of the international search report:
24 March 2005

Published:

— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.